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1. What is nuclear waste?

Simply stated, nuclear waste is the effluent from nuclear reactors and waste material from weapons processing. However, there really is much more to it. We mine natural uranium, process and refine the fissile material as fuel for nuclear reactors. This material then resides in a high neutron flux for about 18 months while producing power. At the end of the fuel cycle, the left-over material is nuclear waste and it is composed of more than 200 different radioactive isotopes, some with half-lives greater than 1 million years.

2. How much nuclear waste exits?

In the US alone we have some 56,000 tons currently and from our 104 nuclear power plants presently running, we continue to generate high-level nuclear waste at a rate of 3,000 tons per year. The current stockpile of low-level nuclear waste is about 1.6 million cubic feet. To put that into perspective, that volume would fill a football stadium about 50 feet deep.

3. How is nuclear waste currently disposed of?

Most of the world has committed to deep geologic burial. That is, they plan to put it into steel drums and store it below ground. Here in the US we have some 40 temporary above ground storage sites with the plan ultimately to store all the high-level waste in Yucca Mountain, Nevada and the low-level waste at the Waste Isolation Pilot Plant or WHIPP for short in New Mexico. The problems associated with this plan are many, but in short, the problem is that they have no steel drum that can contain this waste for more than 50 years below ground let alone thousands or millions of years. Once a leak in the drum occurs, then you have ground water solubility problems which lead to uptake by the general populace. Other technical problems exists such as how to cool the waste and what to do with the constant out-gassing that occurs. Some countries have tried fuel reprocessing, which recovers the usable fuel from the nuclear waste, but this results in concentrated high-level waste as well as weapons grade material and all the problems associated with that.

4. What is the "half-life" of this waste?

The half-life is the natural decay of any radioactive material. Yes, all radioactive material will naturally decay into something stable. Unfortunately, for many of the radioactive isotopes, this process takes thousands or millions of years. The half-life is the time it takes for half the material to change into something else. Typically, after about 10 half-lives the material is no longer radioactive.

5. What is your process and how does it differ from current practice?

The reason a material is radioactive is that each of its atoms contain too many particles and an excess of energy. These atoms are trying to get rid of the odd particle, and will eventually. What we do is use a specific type of x-ray called a gamma ray to actually drive out the unwanted particle. That is, we put in enough energy to drive the particles out. Technically speaking, we use a process called photodisintegration, as well as photofission, whereby we inject a gamma ray greater than the binding energy of the neutron, which results in the emission of that neutron. The end product is either stable or has a very short half-life.

6. Am I correct in understanding that your process eliminates nuclear waste and produces power?

That is the beauty of our process. We reduce nuclear waste to non-radioactive materials and the process produces a great deal of excess power. Since the nuclear waste itself is sub-critical we have a safe clean form of producing nuclear power by burning the existing nuclear waste. Again, technically speaking, the photofission of a single depleted uranium atom requires only 6 MeV and produces about 200 MeV. The processes involved are very complex, but the end result is excess power out. One form of nuclear waste you may have heard of is called depleted uranium. The US currently has many tons of this material with no practical application. We can burn it in our photon reactors to make power.

7. What is the status of this technology?

We currently have one US patent issued, with two other international patents in print and several patents pending in many countries. This process clearly works on the laboratory scale; what we need to do is ramp up to industrial scale, and this is our unknown since it has yet to be done. However, the standard in the nuclear industry is to use Monte Carlo simulations or MCNP Modeling. This is a computer simulation used to design nuclear reactors as well as bombs and is extremely accurate. Dr. Qi Ao is one of the leading authorities in writing and developing MCNP code and is currently working for us exploring the parameters of our Hypercon Remediation process. Preliminary modeling has been very favorable and suggests that industrial scale processing of nuclear waste is practical. Of course, this still needs to be proven by actual testing at the industrial level and we are working towards renting accelerator time to run this empirical study.

8. Why a public company rather than letting the government develop it?

The technology exists right now to implement this technology. We do not have to develop any new equipment or technology. I feel that government labs would spend the next twenty years or more running experiments, while we continue to spend more than 8 billion dollars per year shipping nuclear waste around temporary storage sites, with no solution in sight. We as a planet, need to apply this technology now.

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9. Have you had any interest from the Department of Energy?
We have had tremendous interest from DOE and the national labs such as Battelle Pacific Northwest and Los Alamos as well as Pete Domineci, who is the Chair of the Energy and Water Appropriations Committee, which is required to investigate accelerator transmutation of nuclear waste and nuclear reactors that burn plutonium. In our case we fit both requirements. We are also speaking to the French CEA and private nuclear companies both domestic and abroad.

10. How did you come up with this idea?
I have been working in the nuclear industry since 1980, primarily specializing in energy conversion, specifically the conversion of radioactive decay into electricity for specialized power systems, such as satellites and remote communications. I really did just stumble upon it. You see, this process is based upon well known nuclear science. But only recently has our technology progressed to our current point which makes it practical.

11. Where do you go from here?
We are continuing to develop the MCNP code so that we may use it to design experiments and a pilot plant facility. Of course, we still need to run the empirical study and then build a pilot plant. After that, we need collaboration and joint venture relationships with the well established companies in the nuclear industry. This technology is the energy solution for the 21st century.

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